

## **DMMP Clarification Paper**

### **New DMMP Guidelines for Phthalates**

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#### **Introduction**

Apparent Effect Threshold values (AETs) for phthalate compounds were first calculated in 1985 (1). These AET values were based on the highest no effect (“no hit”) concentration among amphipod mortality, benthic community, Microtox luminescence and oyster abnormality indices of effects. These values were subsequently revised to reflect new synoptic data (2). In 1988, the Puget Sound Dredged Disposal Analysis (PSDDA) program adopted screening level guidelines based on one-tenth the highest AET (HAET/10) or the lowest AET (LAET), whichever was lower, as long as the value was greater than the concentration found at reference areas (3, 4). Screening Levels (SLs) for phthalates, however, were among the exceptions. SLs were based on the HAET itself, in part because these compounds were found to be common laboratory contaminants and exhibited relatively low toxicity.

The first Regulatory Work Group (RWG) recommended that PSDDA, now the Dredged Material Management Program or DMMP, should set all SL values equal to LAET values that incorporate the newer amphipod mortality data (5, 6). The majority of the group recommended that SL values should not decline because current guidelines were adequately protective of the disposal site conditions and need not become more stringent. The DMMP agencies agreed with the former recommendation, but disagreed with the latter condition, believing that LAETs should establish the SLs. However, the DMMP agencies acknowledged the different basis for phthalate SLs and agreed, on an interim basis, to set phthalate SLs equal to the newest HAETs (6, 7).

#### **Problem Identification**

The basis of SL values for phthalates used in the DMMP, described above, is inconsistent with the basis of conceptually analogous SQS criteria contained in the Sediment management Standards (SMS) rule. The latter reflect LAETs, not HAET values. SQS values for phthalates and other polar organic compounds are also normalized to total organic carbon (OC) content of the sediment instead of dry weight. This results in programmatic inconsistency and potentially conflicting interpretations of data. For example, a sample containing approximately 1000 ug bis(2-ethylhexyl)phthalate per kilogram dry weight sediment and 2% organic carbon would have 50 mg bis(2-ethylhexyl)phthalate per kilogram organic carbon, thereby exceeding the SQS of 47 mg/Kg OC. However, the sample would not exceed the current SL of 8,300 ppb dry weight. Similarly, if the same sample contained 100 ug butylbenzyl phthalate per kilogram of dry weight, it would exceed the comparable SQS of 4.9 mg/Kg OC but not the current SL of 970 ug/Kg dry weight. In the absence of biological test results, this could be interpreted to mean that the sample might contribute to the need for site

remediation but would be suitable for open water disposal. Of course biological guidelines and standards, which are more consistent between programs, supersede chemical ones.

In addition, because of improvements to analytical methods and standard operating procedures during the past 15 years, the potential for phthalate compounds to contaminate environmental samples should no longer be a major consideration in establishing guideline values.

### Proposed Clarification

The DMMP agencies propose to set the screening level for phthalates at the lowest of the original 1988 dry weight-normalized AETs (amphipod, benthic, Microtox and oyster)<sup>1</sup>. If adopted, the new SL values will replace the old SLs in the DMMP chemical guidelines. Consistent with current guidelines, DMMP agencies do not propose to establish maximum level guidelines for phthalate compounds or require toxicity testing of samples found to exceed only phthalates SLs.

The potential implications of implementing this change were evaluated and the results are summarized in Table 1 below. None of the 1137 samples among 52 past dredging projects exceeded 1988 or 1998 phthalate SLs **only**. Four of the 1137 samples (0.35%) exceeded **only** the proposed SLs based on LAET values. However, even these four samples would not be required to undergo toxicity testing, because of the existing policy described above. The main benefit of this largely cosmetic proposal is for the DMMP to be more consistent with the SMS program.

Chemical Name	1988 SL <sup>a</sup>	# samples w/ detects >SL	1998 SL <sup>b</sup>	# samples w/ detects > SL	2000 SL <sup>c</sup>	# samples w/ detects > SL
Any chemical	Various	430/1137	Various	171/1137	Various	175/1137
Bis(2ethylhexyl) phthalate	3100	0/245	8300	0/245	1300	10/245
Butbenzophthalate	470	1/52	970	0/52	63	17/52
Diethylphthalate	97	0/22	1200	0/22	200	0/22
Di-n-butylphthalate	1400	0/40	5100	0/40	1400	0/40
Di-n-octylphthalate	69000	0/49	6200	0/49	6200	0/49
Dimethylphthalate	160	0/15	1400	0/15	71	0/15
Phthalates only	Various	0/430	Various	0/171	Various	4/175

Table 1. Number of samples exceeding any DMMP SL value, number of samples exceeding individual phthalate SL values, and number of samples only exceeding phthalate SLs. Dataset based on 52 past dredging project projects, 506 station locations (463 with detected chemicals of concern) and 1137 separate samples

<sup>1</sup> Ecology's 1998-1999 efforts to revise Puget Sound AETs and amend the Sediment Management Standards rule did not result in a final, technically valid suite of updated LAETs upon which new phthalate guidelines can be based.

(671 with detected chemicals of concern). a = based on 1986 HAET, b = based on 1998 HAET, c = based on 1998 LAET.

The DMMP agencies believe strongly that best scientific information should be incorporated into evaluation, management and monitoring guidelines in a timely manner (notwithstanding limited resources). Scientific information pertaining to the evaluation of sediment quality is emerging at a rapid rate. The U.S. EPA has finalized equilibrium partitioning-based sediment benchmarks or “ESBs” (8). Ecology may eventually complete the technical work required to finalize new AETs based on a) new benthic community indices, b) decreased Neanthes growth, and c) abnormal development of bivalve larvae, and/or d) abnormal development of echinoderm larvae. And there are even newer approaches to calculating sediment quality guidelines. Taken altogether, these may lead the agencies to undertake a comprehensive revision of DMMP guidelines in the future. Any such a revision will necessarily need to consider using sediment quality values, such as AETs, in a manner that is conceptually consistent with the SMS program and criteria.

## References

1. PSDDA. 1986. Development of Sediment Quality values for Puget Sound. Volume I. Prepared for the PSDDA agencies by Tetra Tech, Inc.
2. U.S. EPA. 1988. Sediment Quality Values Refinement: Volume I. Update and Evaluation of Puget Sound AET. Prepared by PTI Environmental Services, Inc.
3. PSDDA. 1989. Management Plan Report. Unconfined Open-Water Disposal of Dredged Material, Phases I and II.
4. PSDDA. 1988. Evaluation Procedures Technical Appendix.
5. Regulatory Work Group. 1997. Recommendations Related to Future Evaluations of Apparent Effects Threshold and DMMP Guideline Values. Final Memorandum for Record.
6. Washington Department of Ecology. 1996. Progress Re-evaluating Puget Sound AETs. April 1996 Draft Report.
7. DMMP. 1997. Minutes to the 1997 Sediment Management Annual Review Meeting. [Revisions to DMMP Screening Level and Maximum Level Guidelines.](#)
8. For example, U.S. EPA. 2003. Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms: PAH Mixtures.